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DEVELOPING COMMUNITIES OF PRACTICE IN THE NATIONAL ELECTRONIC LIBRARY FOR HEALTH

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ABSTRACT

The aim of the evaluation project was to examine how specialist areas of the National electronic Library for Health should be developed as virtual communities of practice. The objectives included a review of the research evidence, to identify the factors that affect the successful operation of such communities. The review findings informed the appraisal framework used to assess whether the specialist areas (the Virtual Branch Libraries, in particular) of the National electronic Library for Health portal were evolving as evidence indicated they should. Appraisal findings indicated that most of the Virtual Branch Libraries had successfully evolved beyond the initial stages of community of practice development but that the more sophisticated stages of community of practice existence would require, for example, development of collaborative work tasks. The appraisal framework was successful in identifying some possible barriers to further development, as well as the opportunities for exploiting tacit knowledge within the NHS more cost-effectively than has been possible up till now.

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DEVELOPING COMMUNITIES OF PRACTICE IN THE NATIONAL ELECTRONIC LIBRARY FOR HEALTH

INTRODUCTION

The National electronic Library for Health (NeLH) in the UK is intended for both health professionals and patients, to support the use of proper evidence in health care practice and policy. There are many areas within the NeLH portal, and one area, termed the Virtual Branch Libraries (VBLs) encompasses a range of more specialist interests (e.g. Cancer, Emergency Care, Primary Care). Similarly, the Professional Portals support the various health professional groups. Development of the VBLs was devolved to groups or individuals with the appropriate specialist interests and web development skills. Although neither the Virtual Branch Libraries nor the Professional Portals were developed originally as communities of practice, the NeLH development team realised that the Virtual Branch Libraries (and, to a lesser extent, the Professional Portals) did share many of the social learning aims of communities of practice.[1] The authors of this paper conducted an independent evaluation of the Virtual Branch Libraries (VBLs) for the NeLH team. This included a systematic review of the literature, to determine the factors which make communities of practice effective, development and application of an appraisal framework for the VBLs as well as further scoping studies to aid planning of these areas of the NeLH portal as virtual communities of practice within the NHS, supporting learning, and exchange of experience and knowledge within a very dispersed organisation.

BACKGROUND

The scope of the review covered research evidence concerning the use of the Internet and intranets to support collaborative working, knowledge management and organisational learning, with emphasis on aspects of concern to the health sector in the UK.

The requirements of the evaluation specified a focus on the critical success factors identified by the NeLH team (and which had formed the basis of negotiations with the Virtual Branch Library developers):

- functionality
- usability
- content
- stakeholder involvement
- project management.

For the health sector, knowledge management is usually linked to the concepts of evidence-based practice and reflective professional practice. Organisational learning[2] is closely linked with clinical governance and the support of continuing professional development and changes in practice.

Definitions and explanations of communities of practice vary, but several key ideas seemed pertinent to the evaluation of the Virtual Branch Libraries. These were the concepts of: 1) legitimate peripheral participation,[3] and 2) the possible membership an individual might have in several communities of practice.[1] Any community of practice for the NeLH would need to allow for new members to become engaged in the activities

of the community to an extent that suits their needs and interests, but which also recognises them as legitimate members of the community. In addition, health professionals may belong to several communities, representing their various professional and research interests.

Community of practice evaluations

Most evaluations of community of practice projects used a variety of methods to provide triangulation of the findings. One longitudinal five-year study[4] used participant observation, activity measurement and structured interviews. Other approaches include the case study approach;[5,6] focus groups plus quantitative methods;[7] action research;[8] the American Productivity Quality Council benchmarking methodology;[9] and a social capital framework.[10]

Synthesising the findings from the major evaluation studies, some key themes which emerge are:

- Virtual communities are often based, initially at least, in co-located communities which can then extend participation to distributed members.[5,6] The start can be a formal group or work project team (formal functioning), or with organisational 'prompts' and assistance, as well as an informal, cross-functional grouping.[7,9]
- Trust needs to be fostered through face-to-face communication,[4,11] often consolidated through working on a shared document or task.
- Communities of practice may evolve through stages, but not necessarily in true life cycle format. Communities of practice do develop informally, and vary considerably in the format and quantity of their activities.[4,7]

- Evaluation of the effectiveness of communities of practice may also need to focus on ways of measuring the changes in social learning,[8] or community impact[9] or connections (social capital).[10]

Two studies[4,7] stress the diversity of styles of existence. Communities may move backwards and forwards, stick at a particular stage, or rest for a period with a sudden burst of activity to move to another stage. The stages of evolution identified[4] are:

- Potential (connecting individuals)
- Building (allowing individuals to learn more about each other, share experiences and knowledge, create shared norms)
- Engaged (emphasis on access and learning, to provide support to new members and add to the knowledge base)
- Active (emphasis on collaboration and shared work tasks)
- Innovation and Generation (to develop new products and services, and even spawning new communities of practice)

For process support, electronic surveys, polling and feedback tools are appropriate for access and learning stage, and may help support the processes of telling community stories, thus socialising new members and advancing the collective knowledge[12].The difficulty may be one of timing of the appropriate process support. If communities evolve gradually, then it is possible that too much could be provided too soon. Equally, communities might not be able to progress in their social learning due to lack of a particular collaborative tool and Wenger[13] suggests thirteen components of successful communities of practice which technology can affect – for better or for worse.

For the purposes of developing an appraisal framework that was appropriate for the UK health sector context, several propositions were developed around some of the questions which emerged from the literature review. These propositions helped to focus the synthesis of the evidence, particularly when the review required examination of some of the components of community of practice working, such as the comparative benefits of computer mediated communication and face-to-face communication.

Two of the propositions were:

1) Communities of practice are not totally dependent on face-to-face communication
2) Virtual communities communicate in different ways from communities which rely at least partly on face-to-face communication

For the National electronic Library of Health setting these were key issues, as the development of Virtual Branch Libraries and Professional Portals as communities of practice depends on the effectiveness of a virtual mode of working, although most social learning might be expected to be dependent on face-to-face communication, personal demonstration and practice of certain skills. There is a trade-off between quantity and quality of interaction. Losses might be associated with:

- lack of media 'richness'[14] though to some extent multi-media technology can overcome some of the limitations
- difficulty of participation, aggravating the formation of relationships that cement trust and identity[6 11]

- uncertainty about the power relations, and hence the social structure of the community of practice (c.f. the saying ‘On the Internet nobody knows you are a dog’)
- easier evasion of opportunities to communicate (participation can be merely ‘lurking’, rather than speaking and listening)

Gains might be associated with:

- easier access to knowledge resources and the frameworks or templates that support knowledge development
- easier access to the boundary objects which might act as a bridge between different communities of practice – hypertext and Web links acting to make members of one community of practice more aware of possible similarities (and differences) between themselves and another community of practice
- explicit documentation which might provide a scaffolding, and an overview for newcomers to the community (though there is the possibility of confusion as well)

If Proposition One holds, then it seems that the virtual communication, whether by telephone or video conferencing, use of intranets, e-mail, discussion groups, bulletin boards is not inherently different from the communication and participation activities for which it is acting as a substitute, or complement. Part of the defining activity of the community of practice will be to integrate the virtual communication into the repertoire of practice, and it is not now productive or realistic to try to separate ‘real’, i.e. face-to-face communication from ‘virtual’ i.e. electronic communication, and real communities

from virtual communities. On the other hand, one of the lessons of the early development of Regional Learning Networks (for health informatics in the NHS) was that the virtual collaboration required face-to-face meetings and working in small groups.[15]

Theories of group behaviour often emphasise the importance of social exchange. Individuals compare what they contribute to the group with what they receive back from the group, relating this to their personal needs. The cohesiveness of the groups, whether real or virtual, may be affected by a number of factors, but most studies suggest groups must have a common goal or purpose shared by all members, satisfy certain needs, provide rewards, do something, or have some conspicuous success, while being a size that seems congenial and appropriate to the members of the group.

Evidence from the recent literature indicates some trends, but also some paradoxes:

- membership size and communication activity have positive and negative effects on the sustainability of an online community[16]
- particular communication modes are appropriate for particular purposes[17,18]
- face-to-face communication preceded by either asynchronous or synchronous computer mediated communication judged more satisfactory than face-to-face discussion not preceded by computer mediated communication[19]
- choice of computer mediated communication, and extent of participation in online patient support communities compared to traditional face-to-face support may depend on the level of support available elsewhere[20]
- computer mediated communication may have a positive effect on those who might have lower status within a group, e.g. women scientists among scientists in

general[21]and may allow easier communication in difficult situations (e.g. breast cancer support networks[22])

- the effect of anonymity may not necessarily improve the outcomes with group decision support systems (meta-analytic review)[23]
- virtual network building requires role clarity, good project management, training, relationship building and demonstration of success (community health research training[24]
- last, but not least, rewards (e.g. financial or kudos) appear to motivate staff to participate in knowledge sharing and intranets.[25] People participate in virtual communities of practice out of shared interest, reciprocity and assumed norms that it is the right thing to do.[26]

Interpolation of the evidence suggests that:

- the democracy and 'inclusivity' of virtual communities can be overstated. Few, if any, of the studies, which show that anonymity afforded by computer mediated communication increases social inclusion of lower status groups, have been conducted over a sufficiently long time period to demonstrate a long-lasting effect.
- face to face communication is still important, particularly to support initial use, but that users become more sophisticated and versatile with more experience in use of computer mediated communication.
- optimum group size for a virtual community in terms of effective communication is hard to estimate. It is likely to be related to perceived rewards, needs, and effort

involved, as well as the role of the virtual community within the wider social network of the individual.

- effective functioning of a virtual community depends, just as in the physical world, on the group having a purpose and 'doing something'.

There may also be differences of professional communication patterns[27 28] which affect acceptability of virtual communication and the preferred format of virtual communities For communities of practice with the NeLH it might be expected that the presentation of information and the type of activities will vary from one Professional Portal to another, and that Virtual Branch Libraries, which are multidisciplinary in emphasis, might face considerable challenges in trying to cater for the needs of different disciplines as well as the needs of a lay audience.

Learning structures within communities of practice

Other propositions considered for the project concerned the importance of mapping the activities, documents and processes to the needs of the community. The infrastructure . or learning architecture[1] needs to provide for and allow for engagement (e.g. shared repositories, storytelling, joint tasks), imagination (e.g. scenario development, explanations and examples), and alignment (e.g. feedback and audit mechanisms, mediation mechanisms). For the NeLH VBLs the activities, documents and processes need to reflect a wide range of requirements, and cater for the differences in perspective[29] between novices, expert practitioners, knowledge producers and secondary knowledge miners.

Knowledge may be mediated, situated, provisional, pragmatic and contested as it develops[30]and power and politics may be more important considerations in community of practice development[31] than originally envisaged by the founders of the theory. A synthesis[32] of various approaches to organisational learning, as applied to the NHS notes the recent emphasis on the codification of knowledge, as shown in standardised reporting schemes, publication of guidelines, all processes which may conflict with the 'unlearning' processes required to change established in the light of new evidence. Informal networks, practical politics and rewards systems may be important aspects of the learning structures.

APPRAISAL FRAMEWORK

The literature review, together with consideration of the various propositions, suggested that the appraisal should examine whether some key activities of a community of practice could be sustained in the existing Virtual Branch Libraries (VBLs) and Professional Portals, and whether there were any missing elements that might affect future sustainability.

Emphasis was placed on the following stages of a community of practice identified by the most rigorous case study[4]:

- potential (connection)
- building (memory and context)
- engaged (access and learning)
- active (collaboration)

For each of the critical success factors identified by the NeLH team, questions were developed (Figure 1, for an outline list) which related to the key themes governing effectiveness of virtual communities of practice, with emphasis on the processes and enabling technology most relevant to the NeLH. (Figure 2 illustrates this for the usability criterion).

Preliminary appraisals were conducted prior to meeting members of the VBL development teams, based on the details that could be obtained from the Website itself, and full appraisals then developed on the basis of supplementary information obtained from interviews with development teams, and other stakeholders.

Website appraisals were completed for each of the twelve Virtual Branch Libraries that were selected to participate in the study in early 2002. Copies of the individual completed appraisal forms were sent to the relevant VBL developers for comment and the final report incorporated feedback from the developer teams.

RESULTS

Appraisals indicated that each individual Virtual Branch Library performed well on the initial functions of a community of practice, at the Potential and Building stages. The purpose and aims were clear, and all VBLs exhibited at least one of the functions to support new users and most had more than one (e.g. Hot Topics, Jump-to links, New Links). All VBLs had a feedback facility and several actively invited community

members to submit feedback or suggestions (e.g. what links they would like to see). In some cases the feedback forms ask for details about the sender.

In all cases the knowledge-base was presented in an accessible format (e.g. with site maps, search facilities and divided into sections for ease of navigation) and a Help function was often provided to give guidance on how to search and browse the knowledge-base. All VBLs provided features to support policy-making (e.g. access to guidelines and protocols and to appropriate National Service Frameworks, links to the Department of Health/NICE Websites), although one VBL was at a very early stage of development and many of its features were limited.

Evidence of links with other organisations was again apparent in all VBLs. Some simply had a list of Useful Internet Links which included professional organisations and charities etc. Where VBLs have established formal links with specific stakeholder organisations there would frequently be a more prominent link, for example on the front page.

In all cases there is information about the development team and several VBLs already or will soon give contact details of expert contributors to the site. Although there are no directories of members (as these are Internet sites, not private intranets), the VBLs were beginning to use discussion groups and forums to bring members of the community together. This is a key element of the Potential stage of community-building when individuals are given the means to connect with each other. None of the VBLs set out specific guidelines on the norms of behaviour, as might be expected of communities at

the Building stage, although there was plenty of advice about how to use the site and, for example, contribute to discussion forums.

The anticipated members of the community of practice vary among VBLs. Some are aimed solely at professionals, and direct members of the public to NHS Direct Online for appropriate information, others include patients and carers as members. This disparity may reflect the different professional background of the development teams, and consequent attitudes towards involving patients and carers at this stage in development of the VBL.

Although all VBLs have a feedback facility, in most cases there is no indication of what will happen to the feedback once it is received. However, some VBLs do set expectations of how long response to feedback will take or imply that a response will be given via a 'Request for help' facility. It may be that members would feel more part of the community if they were given information about what happens to feedback and suggestions once they are received. For moving from the Building stage to the Engaged stage this seems desirable.

The type of content that might be expected in a community of practice, according to the evaluations included:

- Document and library systems
- Community 'stories'
- Record of collaborative work efforts

- Links to current contents pages of journals
- Links to relevant guidelines
- Links to relevant reports, manuals, coding schemes, etc.
- Links to current research

Excluding the two sites at a pilot stage, the remaining ten sites contained an average of four of the seven different types of key content. Most contained links to guidelines, reports, document systems and current research. The community 'stories' and 'collaborative work efforts' elements were not widely available, reflecting the early stage of development of most VBLs as these elements are more typical of Engaged communities. Only one VBL provided online interactive training tools, to support the access and learning processes one might expect of the Engaged stage.

If these VBLs are to function as virtual communities of practice, information and indications should allow professional and lay users to move to a level of participation appropriate to their needs. In the case of patients this may mean that they are actively directed to NHS Direct Online. Most of the VBLs do in fact have a link to NHS Direct Online but the positioning of the link is more prominent on some than others.

The rhythm of the workplace is reflected in the Hitting the Headlines and Hot Topics features available on most of the VBLs. Abstracts and briefings point users to the latest information and guidelines. Several also have details of conferences and events which not only reflect the rhythm of the workplace but also provide members with the opportunity for face-to-face networking. Personalisation, e.g. via a 'My VBL' or 'Friends of' facility could include features that promote current-awareness (e.g. through regular updates).

Mentoring and collaborative interaction are areas of the communities of practice that have yet to gain momentum. They are features of the Engaged and Active Stages of development and as VBLs begin to move through these stages the collaborative working aspects may grow. Similarly, the supporting of personal and communal identity is currently focussed on building relationships with the community members, inviting them to participate in the shaping of the VBLs via feedback, suggestions for what they would like to see included, and invitations to participate more actively in the development process.

The rewards of membership of the communities are not specifically outlined, although it is clear from looking at the Websites that users gain access to a wide range of information sources, selected for their relevance and quality-controlled. Depending on which VBL is accessed, other features may include one or more of the following: discussion forums; training materials; briefings on selected hot topics; news alerts. Access to resources at a 'one-stop shop' is currently the main reward of community membership but as the communities develop and gain momentum the more 'social' rewards of communication, shared learning and collaborative working should become increasingly apparent.

During the interviews the development teams were asked whether they had evaluation processes in place. All were requesting feedback from community members but have not reached a point of instituting formal evaluation processes. Community leaders have been

identified and, where possible, have been invited to sit on steering committees or to participate in the generating or reviewing of content for the Websites.

Building a community of practice

Much of the literature on communities of practice refers to communities that have built up within individual organisations. Although the VBLs and Professional Portals are NHS projects the members of the communities come from a whole range of environments. Many are indeed NHS employees but from both acute and community settings and with diverse professional roles, others are from the private healthcare sector, the academic sector, policy-makers, or members of the public. Since some VBLs state that they are expecting to be accessed by everybody with an interest in their particular area the mix of members is likely to be complex and dynamic. An individual may be a member of several different communities of practice depending on their needs and interests. Groups identified by the interviewees as likely to have problems accessing the services included paramedics (since most ambulance stations do not have Internet access and most paramedics spend a lot of time out of the stations in any case), private healthcare practitioners and workers in learning disability services.

Some communities, e.g. health managers, may already have a culture of exchanging ideas and mutual support. Initiatives such as Trent Regional Learning Network[15] with its mentoring scheme also encourage exchange of ideas and promote organisational learning for better information management, one of the key roles of a community of practice. Several interviewees also mentioned the use of discussion lists or research groups as a way of keeping in touch with colleagues and obtaining news. The challenge for the VBLs

and Professional Portals is to be seen as a natural environment for such exchanges to take place.

A parochial attitude to guideline development, for example, means that many health staff are duplicating the efforts of others. Examples of ways in which the VBLs and Portals are fostering the development of communities of practice, and promoting best clinical practice cost-effectively include:

- Making contact with external organisations by inviting representatives and 'core community leaders' to sit on VBL/Portal steering committees and advisory boards;
- Supporting the development of 'systems guidelines' rather than having lots of separate guidelines for different stages of treatment;
- Giving contact details of experts on a particular topic;
- Building on a foundation that already existed (e.g. via a Cochrane Collaboration Network, promoting evidence-based practice in one specialist area);
- Fostering collaborative working practices with stakeholder organisations;
- Encouraging exchange of ideas via discussion lists or forums on the Website.

One area where teams expressed some caution was the setting up of discussion lists and forums. Some interviewees felt that there is not a simple way to create meeting spaces using the toolkit and several were unsure that they would be used even if they appeared on the VBLs – community members may already have access to well-established groups via their professional organisations. One stakeholder, a commercial publisher, said that

they would not be launching a discussion list for the online version of their journal. This is partly due to the resources that would be needed to monitor and police it successfully. Interviewees among potential users were asked whether they would consider participating in interactive features such as discussion groups if they were available on the VBLs/Portals. Responses were mixed, with some stating they would be shy to contribute, although others were very positive. In the UK NHS, many staff will need to become acclimatised to this type of discussion, but providing a common work purpose may encourage collaboration.

CONCLUSIONS

The evidence-based approach to the development of the appraisal framework, using question categories derived from the research evidence to flesh out the outline criteria set for the evaluation worked well. The contradictory nature of some of the research findings mean that some questions are more difficult to resolve than others, but it was important for the evaluation to identify those areas of debate. The potential scale of the VBL communities of practice project means that making interpolations from research evidence on communities of practice in more homogeneous organisations is difficult, but the concept of stages of evolution probably works well in an organisation such as the NHS where the pace of ICT development has traditionally been slow, mirroring some of the problems of effecting change in professional practice.

Since the individual VBLs have grown at different rates, have had different sources of funding, and have put considerable effort into the securing of high-quality information

content for the Websites, certain components of the community of practice mix may so far have been given more prominence than others. Some do not as yet have active discussion lists but all have passed through the first Potential stage, having identified their potential community members and made efforts to bring them together through the provision of useful information. They have moved onto the second and third stages of Building and Engaged status, providing a common repository of knowledge, document and library systems and creating the foundations of a collaborative working environment. Members are encouraged to contribute to the knowledge base although a culture of community 'storytelling' has yet to emerge (although the archive of questions and answers accessed via the Professional Portal could be viewed in this way). All invite feedback and are keen to shape the services to meet the needs of their community. The next stage would see integration of the communities' technology with other NHS systems as appropriate. Development of collaborative work tasks would also encourage these communities of practice to move to an Active stage where their benefits would be more apparent to all the stakeholders.

Critical success factor	Questions
Functionality	1. Are the purpose, aim, and identity clear? 2. Are there ways of identifying and locating community members? 3. Is there a clear knowledge management framework, common repository? 4. What functions support newcomers, or visitors? 5. How is evaluation, audit and community 'sensing' achieved? 6. How are links with other groups, and organisations presented? 7. How might policy making in the Department of Health be supported?
Usability	1. How are individuals brought together? 2. Are the roles of participants and the norms of behaviour clear? 3. Is the organisation of knowledge appropriate to the community? 4. Does the process of feedback work transparently?
Content	1. Are there directories of members or equivalent? 2. Does the range of content include document and library systems, community 'stories', record of collaborative work efforts? 3. Are there decision making and analytical tools as well, to support application of the content? 4. Are there links with other systems in the workplace, such as the

	Electronic Patient Record?
Stakeholder involvement	1. What types of participation are possible – and can participants (professional societies, patient groups, research workers, charities, commercial organisations) move to a level of participation appropriate to their needs? 2. How is personal identity and communal identity supported? 3. Are the rhythm of events, news for the workplace reflected? 4. What rewards of membership are apparent? 5. What types of collaborative interaction might be supported? 6. What type of mentoring is available? 7. How is primary care taken into account? 8. Are patients stakeholders, and what might be the relationship with NHS Direct Online or similar?
Project management	1. How is 'senior management' represented? 2. Is there a core of community leaders? 3. How is leadership interpreted? 4. What evaluation mechanisms exist, and how are they acted on? 5. How are diverse roles identified and represented? 6. What mechanisms are there for building trust among community members?

Figure 1: VBL Website appraisal framework

Factor	Rationale
1. How are individuals brought together?	Potential stage, other evaluations stress need for relationship development, some outreach from existing teams, important consideration for professionals used to face-to-face communication
2. Are the roles of participants and the norms of behaviour clear?	Building stage, need for consideration of potential computer mediated communicationproblems in the health sector, different genres
3. Is the organisation of knowledge appropriate to the community?	Building to Engaged stages, some uncertainty about the formats appropriate for different professional groups – and patients
4. Does the process of feedback work transparently?	Engaged to Active stages, helping to support change in practice, and organisational learning

Figure 2: Mapping of usability criteria to factors identified in review

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